STARPOWER

SEMICONDUCTOR **IGBT**

GD75HFL120C1S

1200V/75A 2 in one-package

General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as general inverters and UPS.

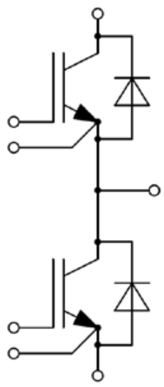
Features

- Low $V_{CE(sat)}$ SPT+ IGBT technology
- Low switching loss
- 10μs short circuit capability
- Low inductance case
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25℃ unless otherwise noted

IGBT

Symbol	Description	Values	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=100℃	150 75	A
I_{CM}	Pulsed Collector Current t_p=1ms	150	A
P_D	Maximum Power Dissipation @ T_j=175℃	534	W

Diode

Symbol	Description	Values	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	75	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	150	A

Module

Symbol	Description	Values	Unit
T_{jmax}	Maximum Junction Temperature	175	℃
T_{jop}	Operating Junction Temperature	-40 to +150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V
M	Terminal Connection Torque, Screw M5 Mounting Torque, Screw M6	2.5 to 5.0 3.0 to 5.0	N.m

IGBT Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=75A,V_{GE}=15V, T_j=25℃		1.90	2.35	V
		I_C=75A,V_{GE}=15V, T_j=125℃		2.10		
		I_C=75A,V_{GE}=15V, T_j=150℃		2.15		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=3.0mA,V_{CE}=V_{GE}, T_j=25℃	5.0	6.3	7.0	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25℃			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25℃			400	nA
R_{Gint}	Internal Gate Resistance			3.0		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		5.52		nF
C_{res}	Reverse Transfer Capacitance			0.26		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.78		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A, R_G=2.2Ω,V_{GE}=±15V, T_j=25℃		187		ns
t_r	Rise Time			41		ns
$t_{d(off)}$	Turn-Off Delay Time			244		ns
t_f	Fall Time			234		ns
E_{on}	Turn-On Switching Loss			3.41		mJ
E_{off}	Turn-Off Switching Loss			4.10		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A, R_G=2.2Ω,V_{GE}=±15V, T_j=125℃		189		ns
t_r	Rise Time			45		ns
$t_{d(off)}$	Turn-Off Delay Time			254		ns
t_f	Fall Time			375		ns
E_{on}	Turn-On Switching Loss			5.09		mJ
E_{off}	Turn-Off Switching Loss			6.40		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A, R_G=2.2Ω,V_{GE}=±15V, T_j=150℃		196		ns
t_r	Rise Time			47		ns
$t_{d(off)}$	Turn-Off Delay Time			257		ns
t_f	Fall Time			407		ns
E_{on}	Turn-On Switching Loss			5.65		mJ
E_{off}	Turn-Off Switching Loss			7.00		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150℃,V_{CC}=900V, V_{CEM}≤1200V		350		A

Diode Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_C=75A,V_{GE}=0V,T_j=25℃		1.90	2.30	V
		I_C=75A,V_{GE}=0V,T_j=125℃		1.90		
		I_C=75A,V_{GE}=0V,T_j=150℃		1.90		
Q_r	Recovered Charge	V_R=600V,I_F=75A, R_G=2.2Ω,V_{GE}=-15V T_j=25℃		5.9		μC
I_{RM}	Peak Reverse Recovery Current			90		A
E_{rec}	Reverse Recovery Energy			3.06		mJ
Q_r	Recovered Charge	V_R=600V,I_F=75A, R_G=2.2Ω,V_{GE}=-15V T_j=125℃		11.3		μC
I_{RM}	Peak Reverse Recovery Current			101		A
E_{rec}	Reverse Recovery Energy			5.50		mJ
Q_r	Recovered Charge	V_R=600V,I_F=75A, R_G=2.2Ω,V_{GE}=-15V T_j=150℃		13.0		μC
I_{RM}	Peak Reverse Recovery Current			105		A
E_{rec}	Reverse Recovery Energy			6.60		mJ

Module Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			30	nH
$R_{CC'+EE'}$	Module Lead Resistance,Terminal to Chip		0.75		mΩ
$R_{\theta JC}$	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.257 0.392	K/W
$R_{\theta CS}$	Case-to-Sink (per IGBT) Case-to-Sink (per Diode)		0.083 0.126		K/W
$R_{\theta CS}$	Case-to-Sink		0.05		K/W
G	Weight of Module		150		g

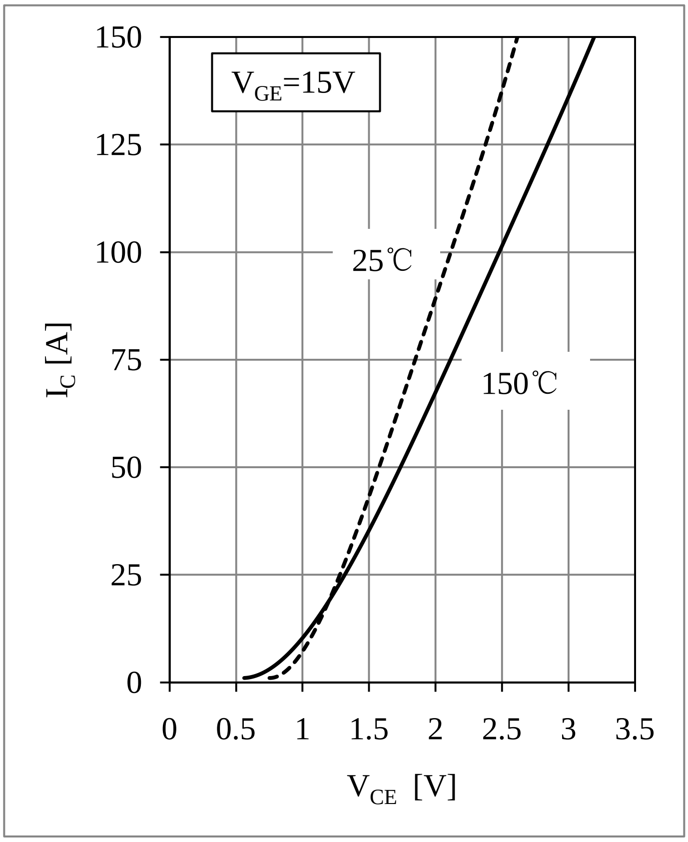


Fig 1. IGBT Output Characteristics

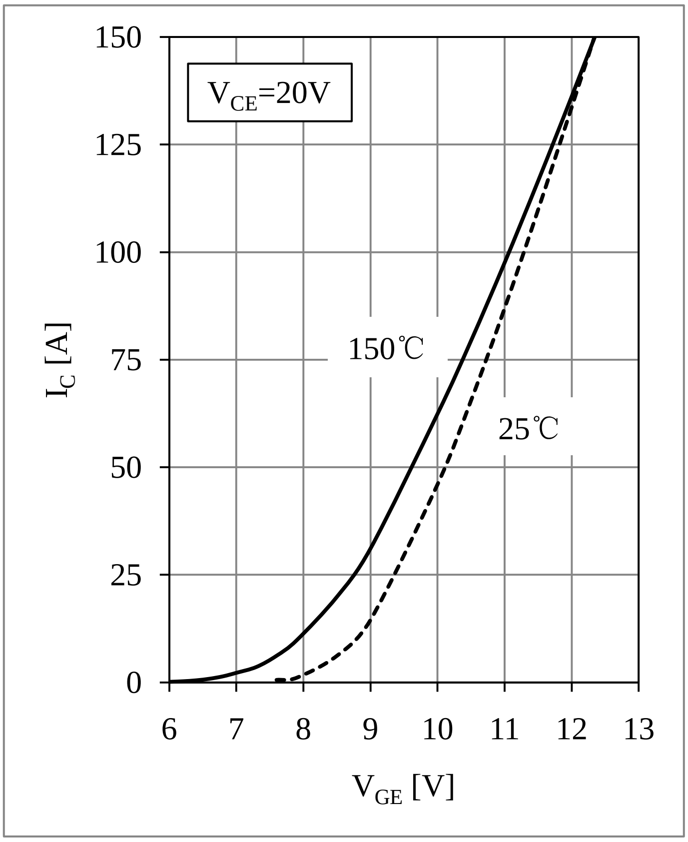


Fig 2. IGBT Transfer Characteristics

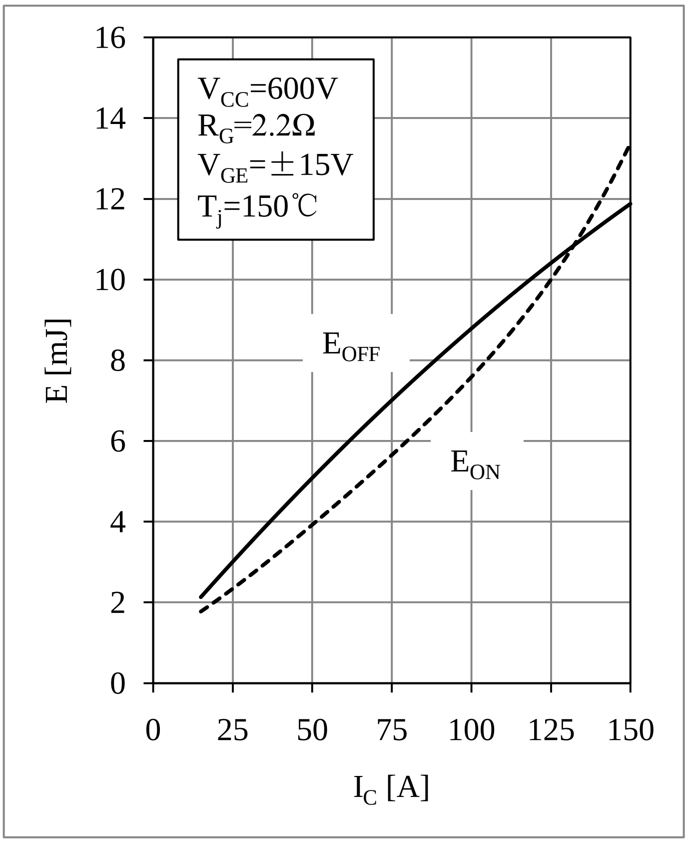


Fig 3. IGBT Switching Loss vs. I_C

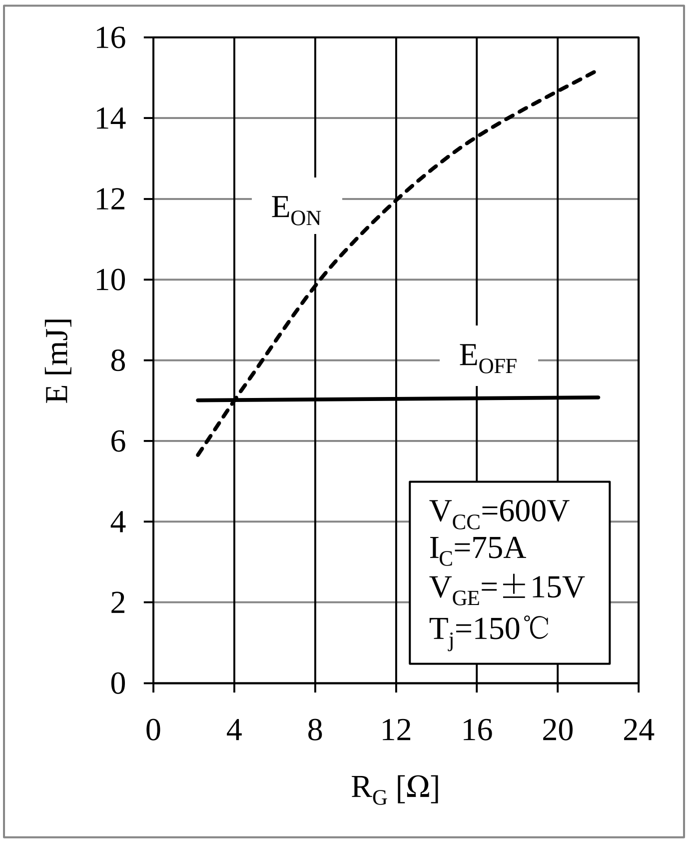


Fig 4. IGBT Switching Loss vs. R_G

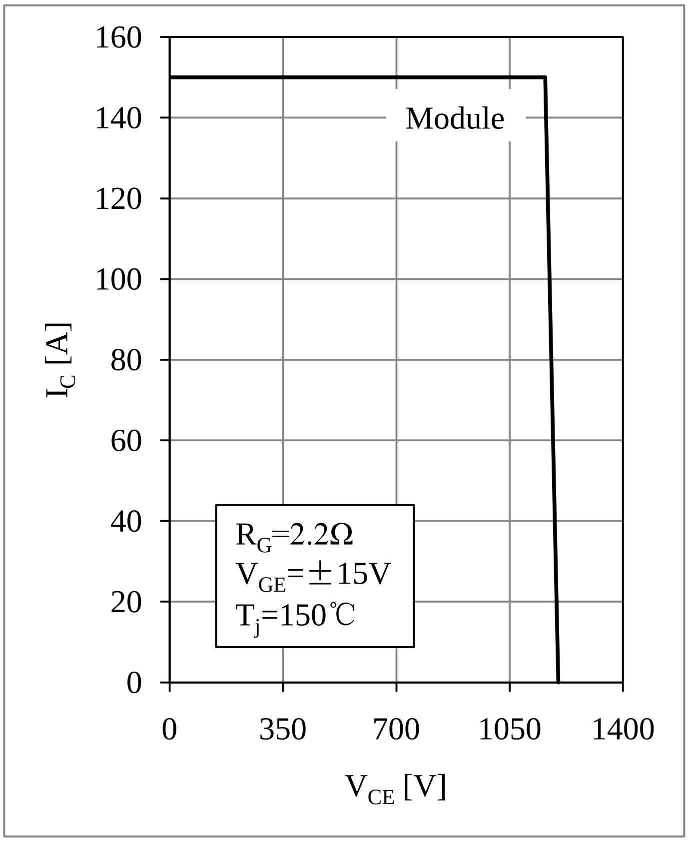


Fig 5. RBSOA

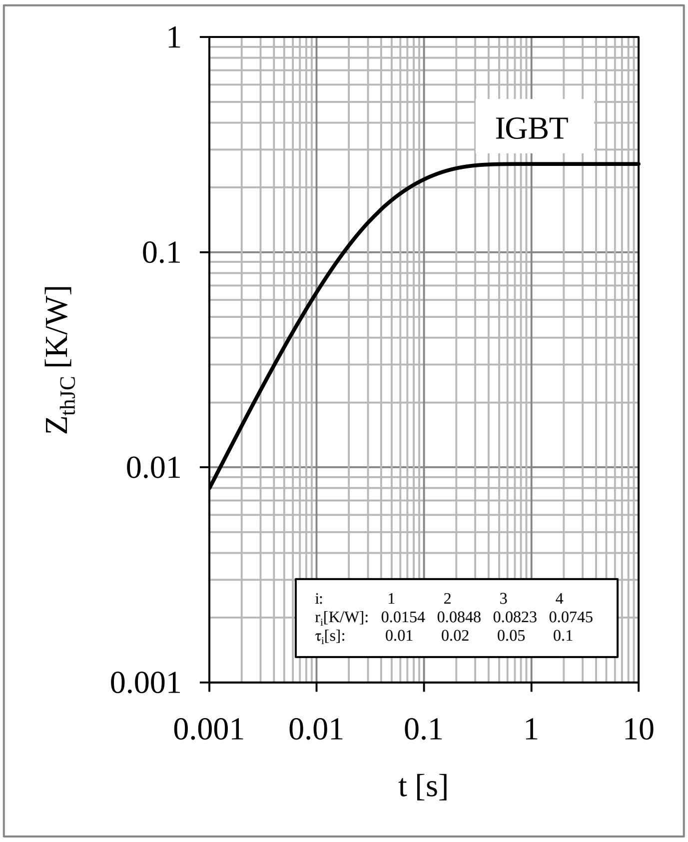


Fig 6. IGBT Transient Thermal Impedance

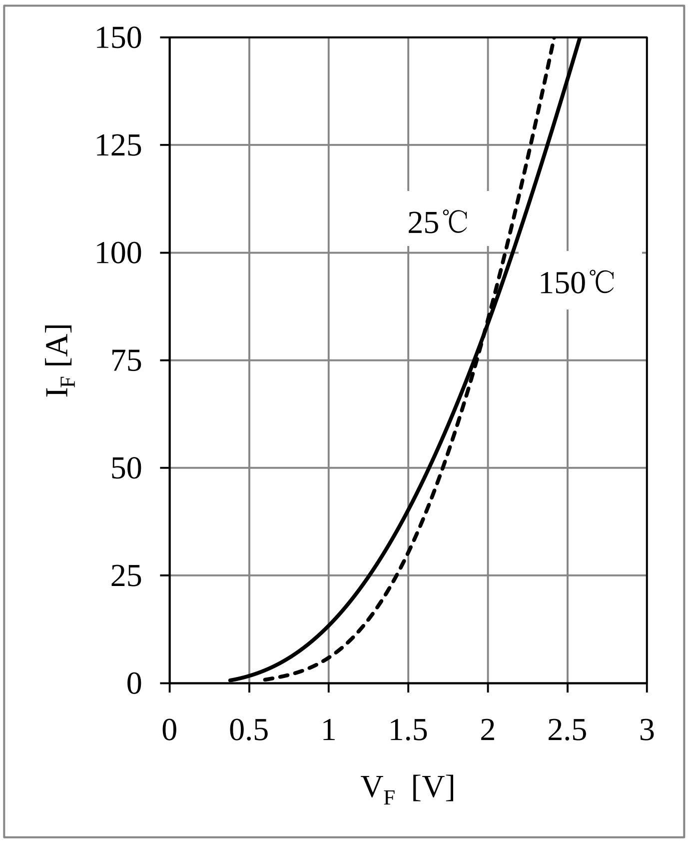


Fig 7. Diode Forward Characteristics

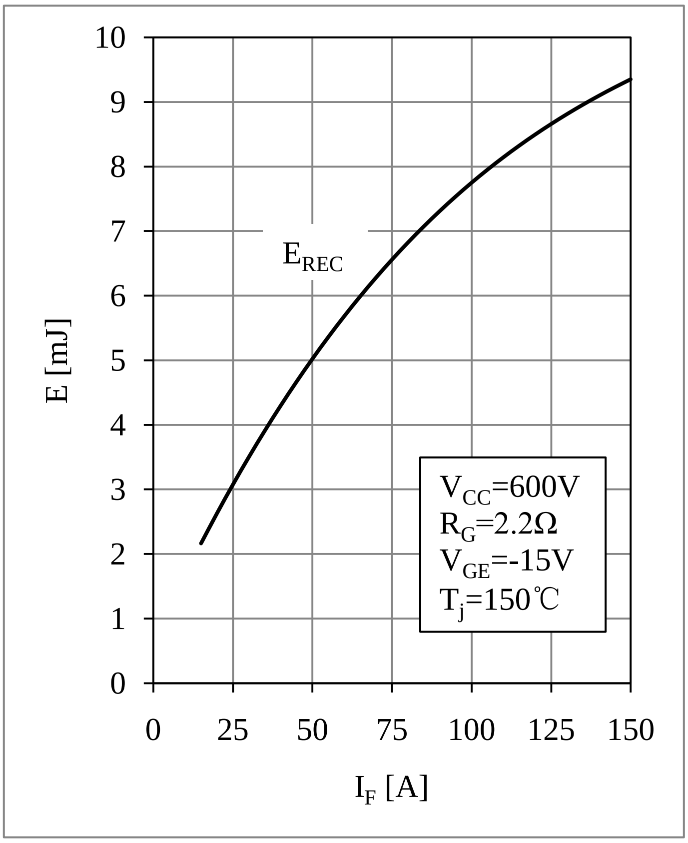


Fig 8. Diode Switching Loss vs. I_F

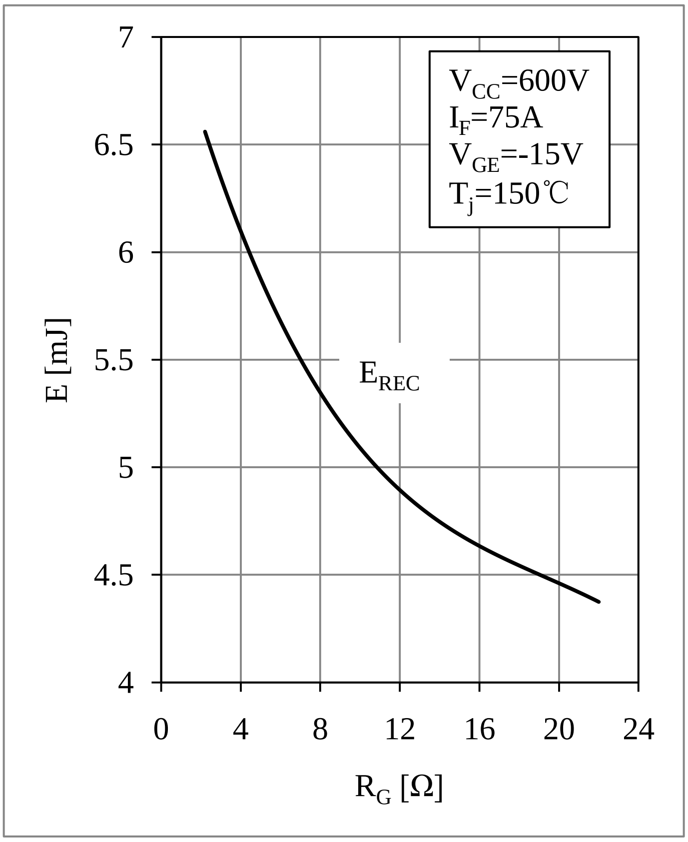


Fig 9. Diode Switching Loss vs. R_G

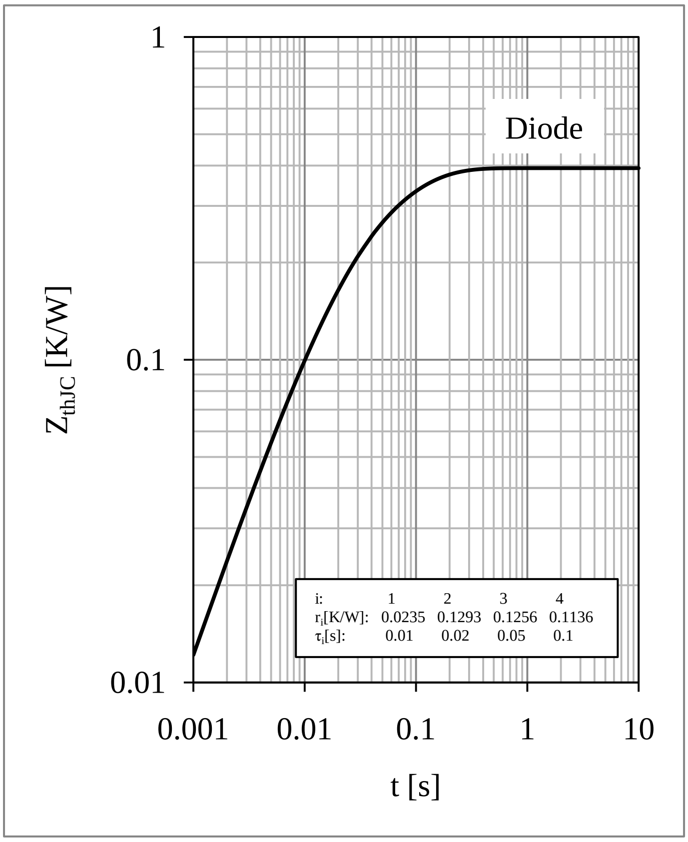
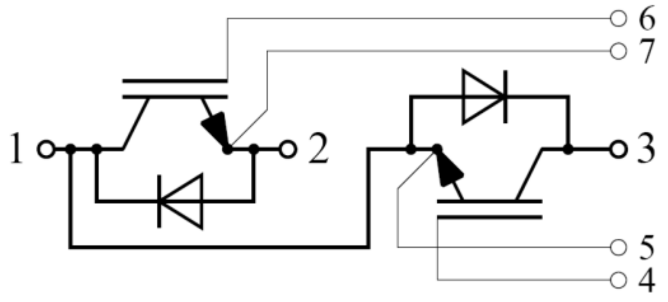


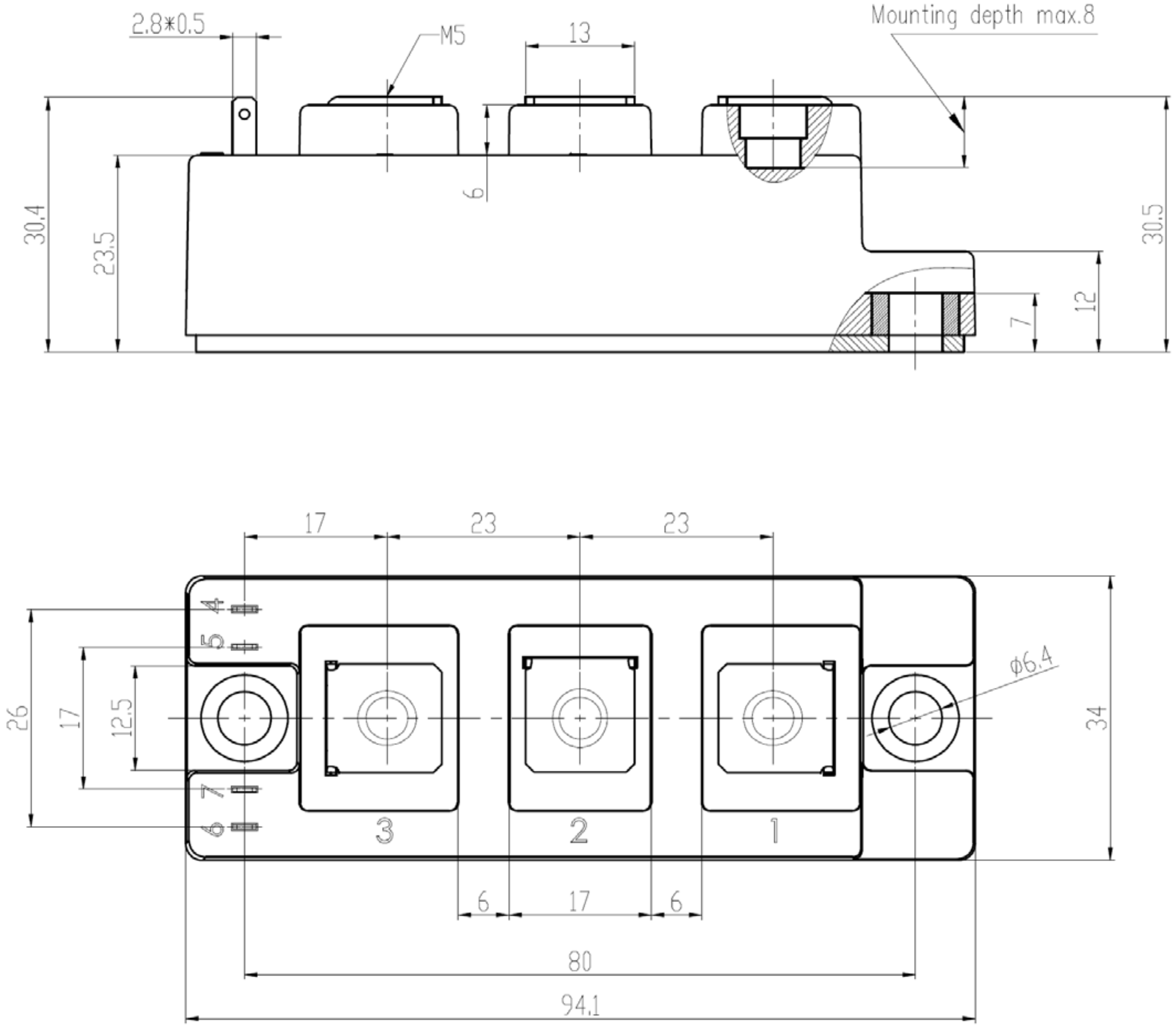
Fig 10. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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